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# **WATER SUPPLY OUTLOOK FOR WASHINGTON**



**U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE**

Collaborating with

DEPARTMENT OF ECOLOGY STATE OF WASHINGTON

Data included in this report were obtained by the agencies named above in cooperation with Federal, State and private organizations listed inside the back cover of this report.

AS OF  
**JUNE 1, 1977**



Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1900 snow courses in Western United States and in the Columbia Basin in British Columbia. Networks of automatic snow water equivalent and related data sensing devices, along with radio telemetry are expanding and will provide a continuous record of snow water and other parameters at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

COVER PHOTO: SNOW COURSE MEASUREMENTS BY A SURVEY TEAM IN UTAH'S WASATCH RANGE.  
ORC-254-10

#### PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, West Technical Service Center, Room 510, 511 N.W. Broadway, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	Room 129, 2221 East Northern Lights Blvd., Anchorage, Alaska 99504
Arizona	Room 3008, 6029 Federal Building, Phoenix, Arizona 85025
Colorado (N. Mex.)	P. O. Box 17107, Denver, Colorado 80217
Idaho	Room 345, 304 N. 8th. St., Boise, Idaho 83702
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1220 S.W. Third Ave., Portland, Oregon 97204
Utah	4012 Federal Bldg., 125 South State St., Salt Lake City, Utah 84138
Washington	360 U.S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 2440, Casper, Wyoming 82602

#### PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia



# ***WATER SUPPLY OUTLOOK FOR WASHINGTON***

and  
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

*Issued by*

R.M. DAVIS  
ADMINISTRATOR  
SOIL CONSERVATION SERVICE  
WASHINGTON, D C

|||||  
*Released by*

GALEN S. BRIDGE  
STATE CONSERVATIONIST  
SOIL CONSERVATION SERVICE  
SPOKANE, WASHINGTON

*In Cooperation with*

WILBUR G. HALLAUER  
DIRECTOR  
DEPARTMENT OF ECOLOGY  
STATE OF WASHINGTON  
|||||

*Report prepared by*

ROBERT T. DAVIS, Snow Survey Supervisor  
and  
NORINE P. KENT, Statistical Assistant

SOIL CONSERVATION SERVICE  
360 U.S. COURTHOUSE  
SPOKANE, WASHINGTON 99201



## WATER SUPPLY OUTLOOK

State of Washington

June 1, 1977

\*\*\*\*\*  
\* \* \* \* \*  
\* In the state of Washington, the water supply picture has \*  
\* turned into a paradox. The month of May was a good month for \*  
\* rainfall, but the rivers are still not flowing. Last year it \*  
\* was just the opposite - poor rain but good river flows. The \*  
\* only explanation that I can think of is the fact that there is \*  
\* no snow in the hills. The few snow courses measured in this \*  
\* state and in tributary areas indicate the snow pack to be less \*  
\* than 50 percent of normal and those are the ones with snow. \*  
\* Many of the snow courses that do have records as of June 1 \*  
\* are bare. The rainfall we have been receiving has got to be \*  
\* going into the watershed soils for both soil priming and, \*  
\* hopefully, later runoff during the summer months when we are \*  
\* going to need it very badly. Of course the rivers are being \*  
\* managed for the best ultimate use of the water. None is being \*  
\* wasted that can possibly be saved. Irrigation canals had \*  
\* water in them as of June 1, but not as much as normally would \*  
\* occur for this time of year. Reservoirs are being controlled \*  
\* and even fish water is being limited because of the need for \*  
\* every drop of water. \*  
\* \* \* \* \*  
\*\*\*\*\*

### SNOW COVER

We have fewer than normal snow course measurements as of June 1 this year, mainly because all the snow was gone as of May 1 or May 15. Those few snow courses, such as in the Bakers, that were measured indicate the snow pack to be less than 50 percent of normal; in British Columbia - also less than 50 percent of normal. There are always one or two exceptions, but none where the snow pack is up to normal.

## PRECIPITATION

Rainfall during the month has been above normal in all reported stations that are used by the Soil Conservation Service for their analysis. The range has been from 2 percent above normal to 200 percent above. This rainfall is not showing up in the streams because it is going into the soils and into the ground water table. While we are not seeing this precipitation now in the form of streamflow, we will start to see it in July or August when it is most needed.

## RESERVOIRS

All in all the reservoirs look like they are in pretty good shape as of June 1. The problem is that the runoff is over and any draw down now will not be refilled. In the Yakima Basin, the Bureau of Reclamation reported that Lake Cle Elum was full and Bumping Lake filled and spilled in the middle of May. They say the Keechelus might fill if the good rains continue, but Kachess and Rimrock are not expected to fill this year. The Okanogan Irrigation District reservoirs are not full and are being drawn down for use at this time. The power reservoirs, other than Coeur d'Alene Lake, are not full and it depends upon subsequent weather factors whether they will fill or not, but it is unlikely.

## STREAMFLOW

Over the state, flows ranged from a low of 12 percent for the Walla Walla River, as measured at Touchet, to a high of 72 percent for the Cowlitz at Castle Rock. The main stem flowed 50 percent of normal and a little above for the month. The Soil Conservation Service does not make water supply forecasts as of June 1, but if we did, we would have to increase our forecasts 2 to 5 percent from that issued on May 1, because of these above normal rainfalls that have occurred during May and the continued below normal runoff from the streams. The drouth situation is NOT over. Water shortages WILL occur later this summer.



RESERVOIR STORAGE - 1000 Acre Feet

BASIN OR STREAM	RESERVOIR	USABLE 1/ CAPACITY	Measured June 1			
			1977	1976	1975	Normal*
<u>COLUMBIA</u>						
Spokane	Coeur d'Alene Lake	225.1	239.6	269.1	326.8	299.8
Columbia	Franklin D. Roosevelt Lake	5232.0	2580.9	3740.7	600.2	3239.1
Columbia	Banks Lake	714.9	616.0	648.0	507.5	446.7
Okanogan	Conconully Reservoir	13.0	6.5	13.0	12.1	10.4
Okanogan	Salmon Lake	10.5	9.4	10.5	10.5	9.3
Chelan	Lake Chelan	676.1	391.3	487.8	339.5	481.4
<u>YAKIMA</u>						
Yakima	Keechelus Lake	157.8	140.6	143.7	129.4	147.5
Kachess	Kachess Lake	239.0	223.6	226.5	191.9	226.2
Cle Elum	Lake Cle Elum	436.9	391.8	387.1	336.4	387.3
Bumping	Bumping Lake	33.7	34.9	25.8	16.9	27.7
Tieton	Pimrock Lake	198.0	161.9	177.4	142.7	172.0
<u>PUGET SOUND</u>						
Skagit	Ross Reservoir	1404.1	689.9	1034.1	736.8	708.6
Skagit	Diablo Reservoir	90.6	86.8	86.6	88.8	84.8
Skagit	Gorge Reservoir	9.8	7.9	9.2	9.0	-

1/ Based on Active Storage

\* 15-year Average 1958-72

# PRECIPITATION 1/

## Division Average Observations and Departures

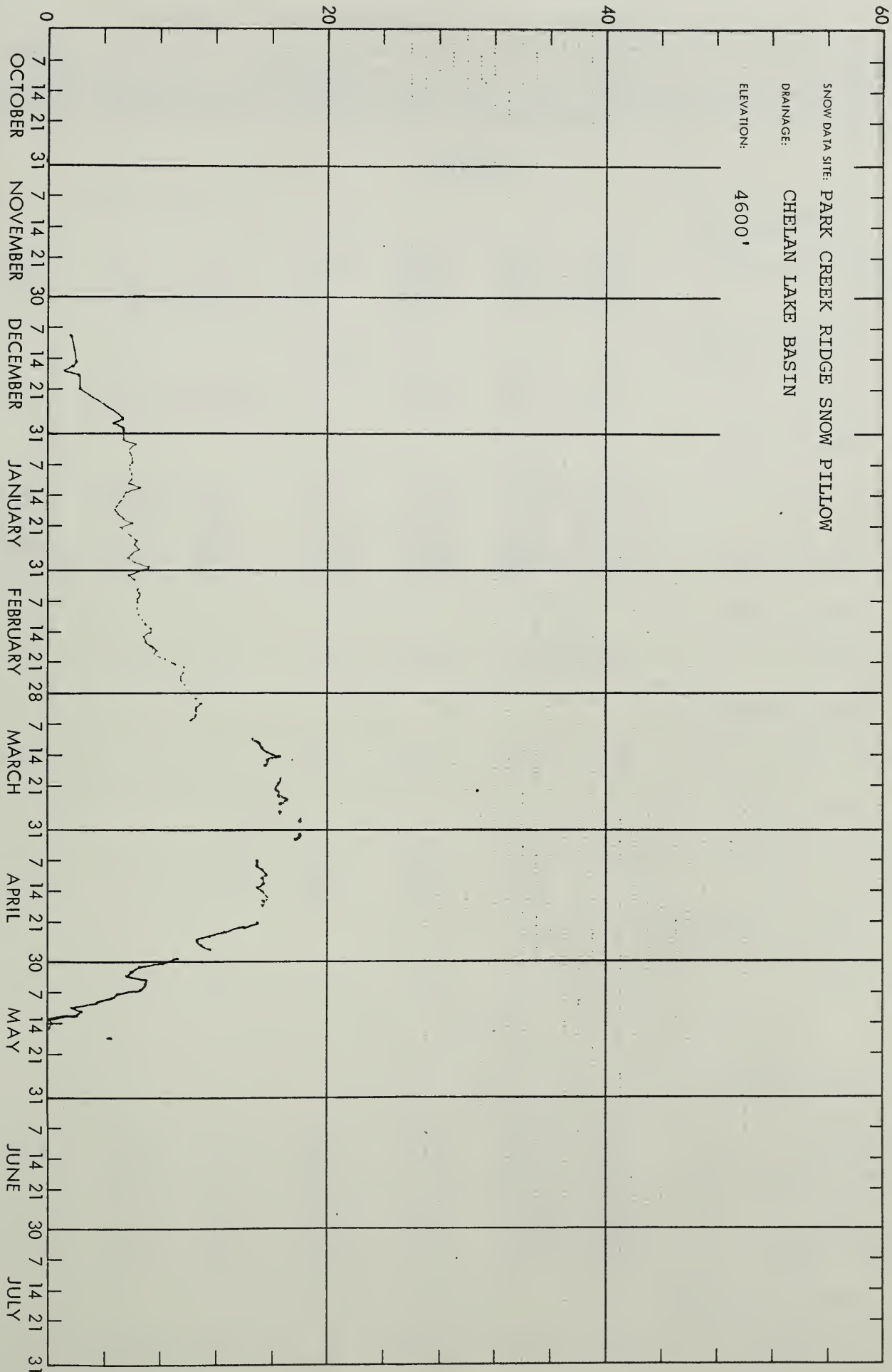
Drainage Divisions	FALL		WINTER		SPRING	
	Sept-Oct Observed	1976 <u>2/</u> Departure	Nov.-1976--Mar.-1977 Observed	Departure	April-May 1977 Observed	Departure
Columbia in Canada	3.10	- 1.92	8.92	- 6.59	3.40	- 0.07
Pend Oreille - Spokane	1.54	- 2.50	8.23	- 9.32	3.19	- 0.66
Northeastern Washington	0.87	- 1.60	3.80	- 5.60	2.46	- 0.55
Southeastern Washington	1.45	- 1.06	4.28	- 6.15	2.08	- 0.85
Central Washington	1.24	- 3.57	11.28	-16.25	2.22	- 1.10
North Central Washington	0.61	- 0.98	3.26	- 3.28	2.24	- 0.32
Northwest Slope Cascades	6.65	- 6.56	35.21	-20.18	8.99	- 1.41
Southwest Slope Cascades	4.30	- 4.37	18.34	-23.30	7.07	- 0.23
Northeastern Washington			- Lower Spokane, Colville, Sanpoil and Lower Kettle Drainages.			
Southeastern Washington			- Touchet, Tucannon and Palouse Drainages.			
Central Washington			- Yakima, Wenatchee and Chelan Drainages.			
North Central Washington			- Methow and Okanogan Drainages.			
Northwest Slope Cascades			- Puget Sound Drainages.			
Southwest Slope Cascades			- Lower Columbia Drainages.			

1/ - Preliminary analysis by National Weather Service from data furnished by Meteorological Services of Canada and the National Weather Service.

2/ - Departure from 15-year (1958-72) drainage division average.

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INCHES OF WATER IN SNOWPACK



## CORRECTIONS AND ADDITIONS - 1977 SNOW REPORTS - APPENDIX 1

## SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Number	Elevation				Last Year	Average #

February 1

COLVILLE RIVER

Stranger Mountain	17A05	5990	<u>1/29</u>	8	0.8	4.0	11.0
Togo	18A10	3370	<u>1/29</u>	6	0.5	5.6	10.1

OKANOGAN RIVER

Mutton Creek # 1	19A01	5700	<u>1/27</u>	0	0.0	8.3	10.4
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CHELAN LAKE

Cloudy Pass +	20A22a	6500	<u>2/1</u>	<u>15</u>	<u>5.6</u>	<u>39.3</u>	<u>29.0</u>
Little Meadow +	20A24a	5275	<u>2/1</u>	<u>17</u>	<u>6.3</u>	<u>38.3</u>	<u>32.2</u>
Lyman Lake +	20A23A	5900	<u>2/1</u>	<u>40</u>	<u>14.8</u>	<u>50.2</u>	<u>42.1</u>
Park Creek Ridge	20A12A	4600	<u>2/1</u>	<u>19</u>	<u>7.0</u>	<u>41.6</u>	<u>34.1</u>

ENTIAT RIVER

Shady Pass	20A37	6200	<u>1/27</u>	10	<u>2.7</u>	28.8	-
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WHITE SALMON

Cultus Creek	21C12	4000	<u>12/27</u>	<u>7.4</u>	2.7	12.9	17.8
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LEWIS RIVER

Lone Pine Shelter	21C26	3800	<u>12/27</u>	<u>4.1</u>	1.3	13.8	17.0
Surprise Lakes	21C13A	4250	<u>12/27</u>	<u>6.8</u>	3.0	12.3	20.1

SKAGIT RIVER & METHOW RIVER

Harts Pass	20A05A	6500	<u>1/26</u>	<u>31</u>	9.7	43.7	32.7
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March 1

CEDAR RIVER

City Cabin	21B03	2390	<u>2/28</u>	<u>4.2</u>	0.9	17.9	13.5
Mt. Gardner	21B21	3300	<u>2/28</u>	<u>1.6</u>	0.4	16.2	15.6
Mt. Washington	21B13	3000	<u>3/1</u>	<u>4.4</u>	0.5	9.8	-
Rex River	21B17	2400	<u>2/28</u>	<u>2.2</u>	0.6	17.6	8.9
S. F. Cedar	21B06	3000	<u>2/24</u>	<u>2.1</u>	0.3	17.0	17.3
Tinkham Creek	21B20	3400	<u>2/24</u>	<u>3.7</u>	0.8	20.5	20.0

SNOQUALMIE RIVER

Lake Elizabeth	21B19	2900	<u>2/25</u>	<u>16</u>	2.6	35.7	36.4
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# Average based on 1958-72 Average

+ Water equivalent estimated from aerial stadia observation.



## CORRECTIONS AND ADDITIONS - 1977 SNOW REPORTS - APPENDIX 2

**SNOW**

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Number	Elevation				Last Year	Average #

April 1

WHITE RIVER

Corral Pass	21B13	6000	3/29	<u>59</u>	<u>16.5</u>	-	41.6
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CEDAR RIVER

S. F. Cedar	21B06	3000	3/28	30	<u>8.0</u>	25.8	20.6
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SNOQUALMIE RIVER

Olallie Meadow	21B02	3625	3/30	<u>70</u>	22.6	57.8	48.8
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YAKIMA RIVER

Stampede Pass SP	21B10	3860	3/31	-	<u>14.4</u>	49.2	43.4
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# Average based on 1958-72 Average.

## SNOW DATA TO JUNE 1, 1977 - APPENDIX 3

## SNOW

DRAINAGE BASIN and or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	
NAME	Number	Elevation				Last Year	Average #

## U P P E R C O L U M B I A D R A I N A G E

PEND OREILLE RIVER

Baree Creek	15B11	5500	5/13	16	7.8	45.7	42.6
Baree Midway	15B16	4600	5/13	4	1.6	26.2	24.5
Baree Trail	15B15	3800	5/13	0	0.0	0.0	0.0
Lookout	15B02	5250	5/13	1	0.4	24.8	30.9
			5/31	0	0.0	14.6	-
Nelson	19-Can	3050	5/13	0	0.0	0.6	1.1*
Schweitzer Bowl	16A06	4500	5/25	0	0.0	0.0	-
Schweitzer Ridge	16A05	6100	5/25	0	0.0	24.0	-

KETTLE RIVER

Big White Mtn.	154-Can	5500	5/14	21	7.9	18.5	19.5*
			5/30	11	4.0	13.6	11.4*
Carmi	126-Can	4100	5/15	0	0.0	0.0	0.0*
Monashee Pass	48A-Can	4500	5/13	9	5.0	9.0	9.6*
			5/27	0	0.0	2.6	2.3*
Trapping Creek Lower	166-Can	3050	5/15	0	0.0	0.0	0.0*
Trapping Creek Upper	165-Can	4450	5/15	0	0.0	0.0	0.5*

SPOKANE RIVER

Lookout	15B02	5250	5/13	1	0.4	24.8	30.9
			5/31	0	0.0	14.6	-

OKANOGAN RIVER

Aberdeen Lake	6A-Can	4300	5/15	0	0.0	-	0.1*
Blackwall Mountain	100-Can	6250	5/13	31	13.0	44.4	38.5*
			5/31	26	11.6	37.6	30.2*
Brenda Mine	193-Can	4800	5/15	0	0.0	0.0	3.2*
Brookmere	27-Can	3200	5/13	0	0.0	0.0	2.9*
Enderby	130-Can	6250	5/13	72	30.2	44.1	46.2*
			5/30	66	29.9	45.9	41.5*
Esperon Creek Lower	164-Can	4400	5/15	0	0.0	-	4.1*
Esperon Creek Middle	163-Can	4700	5/15	0	0.0	-	7.8*
Hamilton Hill	107-Can	4900	5/12	0	0.0	8.7	7.0*
Isintok Lake	152-Can	5510	5/15	0	0.0	2.8	5.7*
Lost Horse Mountain	105-Can	6300	5/13	9	2.9	5.8	10.6*
			6/1	3.5	1.2	4.3	4.4*
McCulloch	4-Can	4200	5/15	0	0.0	0.0	0.6*
Missezula Mountain	106-Can	5100	5/15	0	0.0	0.0	2.3*
Mission Creek	5A-Can	6000	5/13	32	12.5	21.7	19.7*
			5/26	27	10.2	16.8	12.4*

# Average based on 1952-72 average

\* Average for years of record

## SNOW DATA TO JUNE 1, 1977 - APPENDIX 4

## SNOW

DRAINAGE BASIN and/or SNOW COURSE			THIS YEAR			PAST RECORD	
			Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (inches)	
NAME	Number	Elevation				Last Year	Average #

OKANOGAN RIVER (Cont.)

Monashee Pass	48A-Can	4500	5/13	9	5.0	9.0	9.6*
			5/27	0	0.0	2.6	2.3*
Mount Kobau	156-Can	5950	5/13	8	2.3	6.4	11.6*
			5/30	0	0.0	4.9	4.3*
New Copper Mountain	46A-Can	4300	5/13	0	0.0	0.0	-
New Penticton Res. #2	183-Can	5225	5/15	0	0.0	3.4	8.3*
Nickel Plate Mtn.	47-Can	6200	6/1	0	0.0	-	-
Silver Star Mountain	99-Can	6050	5/15	28	11.8	29.4	27.3*
			5/29	18	6.9	22.6	15.5*
Summerland Reservoir	3A-Can	4200	5/15	0	0.0	0.6	3.0*
Trout Creek	3-Can	4700	5/12	0	0.0	0.4	2.0*
Vaseux Creek	233-Can	4600	5/15	0	0.0	0.0	0.4*
White Rocks Mountain	70-Can	6000	5/12	3	0.9	14.0	25.4*

ENTIAT RIVER

Blue Creek G.S.	20B28a	5425	5/27	0	0.0	34.2	-
Entiat Meadows +	20A33a	4540	5/27	0	0.0	25.2	-
Entiat River Trail +	20A34a	3325	5/27	0	0.0	0.0	-
Four Mile Ridge +	20B27a	6800	5/27	0	0.0	31.6	-
Fox Camp +	20A36a	6510	5/27	40	22.1	68.4	-
Pope Ridge	20B20	3540	5/27	0	0.0	0.0	-
Pugh Ridge +	20A32a	6725	5/27	0	0.0	30.0	-
Shady Pass	20A37	6200	5/27	0	0.0	20.0	-
Snow Brushy +	20A35a	3910	5/27	0	0.0	0.0	-
Tommy Creek +	20B21a	4900	5/27	0	0.0	0.0	-

WENATCHEE RIVER

Stevens Pass	21B01	4070	5/13	33	15.5	54.3	48.3
Stevens Pass Sand Shed	21B45	3700	5/13	0	0.0	29.4	-

SKYKOMISH RIVER

Stevens Pass	21B01	4070	5/13	33	15.5	54.3	48.3
Stevens Pass Sand Shed	21B45	3700	5/13	0	0.0	29.4	-

BAKER RIVER

Baker Pass +	21A27a	4900	6/2	103	57.0	111.0	-
Dock Butte	21A11a	3800	6/2	36	20.0	74.0	58.0
Easy Pass	21A07a	5200	6/2	54	30.0	105.0	73.6
Jasper Pass	21A06a	5400	6/2	74	41.0	109.0	84.2
Marten	21A09a	3600	6/2	60	33.0	92.0	66.2
Mount Blum +	21A18a	5800	6/2	90	50.0	92.0	-
Schreibers Meadow	21A10a	3400	6/2	6	3.0	56.0	48.6
Watson Lakes	21A08a	4500	6/2	50	28.0	85.0	61.4

+ Snow water equivalent estimated from aerial stadia observation.

# Average based on 1958-72 average.

\* Average for years of record.





# Agencies Assisting with Snow Surveys

## GOVERNMENT AGENCIES

### Canada:

Department of Lands, Forests and Water Resources,  
Water Resources Service, British Columbia

### States:

Washington State Department of Ecology  
Washington State Department of Natural Resources

### Federal:

Department of the Army  
Corps of Engineers  
U. S. Department of Agriculture  
Forest Service  
U. S. Department of Commerce  
NOAA, National Weather Service  
U. S. Department of the Interior  
Bonneville Power Administration  
Bureau of Reclamation  
Geological Survey  
National Park Service

## PUBLIC AND PRIVATE UTILITIES

Chelan County P.U.D.  
Pacific Power and Light Company  
Puget Sound Power and Light Company  
Washington Water Power Company

## OTHER PUBLIC AGENCIES

Okanogan Irrigation District  
Wenatchee Heights Irrigation District

## MUNICIPALITIES

City of Tacoma  
City of Seattle

*Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.*

UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
ROOM 360, U.S. COURT HOUSE  
SPOKANE, WASHINGTON 99201  
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with the Snow Survey"*

JUL 17 1977

U.S. DEPT. OF AGRICULTURE  
SOIL CONSERVATION SERVICE